

## THE NECESSITY FOR AN IMMEDIATE AND THOROUGH ROENTGENOLOGICAL STUDY OF ALL INJURIES TO THE SPINE\*

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Damage to the spine may be by acute injury, chronic strain or by disease, by any two of these, and not infrequently by all three. Quite severe and often completely disabling symptoms sometimes follow very slight trauma. Such cases are really arthritic but with very slight manifestations; or there are congenital variations in the shape of the bones, causing lessened stability which is always a possible source of weakness. On the other hand, this very slight trauma may be sufficient to fracture a transverse process of a vertebra.

As in other parts of the body, the muscles of the back may suffer from simple strain due to hard labor or heavy lifting. The history will often reveal a few weeks at manual labor by a person who had always lived a sedentary life, the chief symptoms being soreness and stiffness of the lower lumbar region, giving only partial disability, and should gradually pass away without any treatment. Sometimes, however, these symptoms persist and the X-ray study shows a congenitally weak back, or arthritic changes.

There is a great difference of opinion as to what really takes place in the sacro-iliac synchondrosis during trauma. As the X-ray does not reveal any definite variation from the normal in the joint itself, the cause must be carefully sought from a study of the neighboring structures, and from a history of repeated traumatism of the lower back. Heavy lifting, frequently assuming the posture of forward body bend and remaining for an appreciable time, thus stretching the ligaments of the sacro-iliac joints, or direct trauma from a fall or blow, will make the joint very susceptible to acute strain or sprain. Take a case of a person stooping quickly to pick up some light article. He has a sudden sharp pain in the joint itself, inability to assume the erect posture, a sensation of something snapping and deviation of the trunk towards the affected side, which are characteristic of acute sacro-iliac strain. The diagnosis can be confirmed by eliciting marked tenderness over the joint on deep pressure, often a fullness over the joint due to fluid in the joint, a positive Kernig's sign, marked spasm of the erector spinae muscles, especially on the affected side, and marked limitation of motion during lateral bending away from the affected side, due to pain and muscle spasm because of a direct pull on the structures forming the joint.

In a more severe type there is an actual slipping forward of the sacrum on the ilium, up to one-fourth of an inch, and this usually happens when there is a congenital variation of

the first sacral segment, causing an abnormal sacro-iliac joint, or when there is a sacralization of the fifth lumbar vertebra. When there is a dislocation of the sacro-iliac synchondrosis a stereoscopic X-ray is of value in determining the extent and direction of displacement.

In treating acute strain of the sacro-iliac joint, absolute rest of the joint must be insisted upon. Firm adhesive strapping, and recumbent posture on a non-sagging bed with a small pillow supporting the normal lumbar curve, should give prompt relief from the symptoms. After ten days an effort should be made to turn in bed, and if not painful then there should be freedom in bed for a few days before weight-bearing. A support to the lower back with a tight sacro-iliac strap will limit motion in the joint and prevent a recurrence. If these simple measures fail to give relief at once, then a high plaster of Paris spica will be necessary for about three weeks.

A partial dislocation must be reduced by manipulation under a general anaesthetic, the success of which is usually made known by a sharp sound as the joint regains its normal position. Then it should be treated the same as that outlined for acute sacro-iliac strain. These disabilities often become sub-acute or chronic because of the adhesions that have formed around the joint. Stretching is a most efficient form of treatment, and frequently gives instant and permanent relief.

Damage to the lateral lumbo-sacral joints is often overlooked, both clinically and roentgenologically. The causes are the same as in injury to the sacro-iliac joints, with the very important addition of twisting. The subjective symptoms are higher and more deeply seated. Lumbar lordosis is marked, with the trunk flexed toward the affected side, and with marked muscle spasm on both sides of the lumbar spine. As the joint is deep seated, tenderness cannot be relied upon as a symptom. Movements of the thighs, which are painful in injuries to the sacro-iliac joints, are free and painless. A clear X-ray will detect very slight changes in the lumbo-sacral articulation, and frequently reveals a congenital malformation of the articular facets.

It is not uncommon to find in cases of severe and prolonged backache that one of the articular facets of the lumbo-sacral joints has been fractured, and is surrounded by a large amount of dense callous. For strains or sprains there must be complete and prolonged rest. For fracture of an articular facet there should be complete rest in bed for three months, with some form of rigid jacket, followed by three months of gradually increasing activity and support from the jacket during weight-bearing. It is extremely important to limit callous formation so as to prevent pressure on the adjacent nerve roots, which would always cause pain and sometimes paresis.

Rest is absolutely necessary in all acute lesions of the spine. Massage and active and passive exercises are very detrimental during the acute stages, as they increase the formation of bone

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callous or scar tissue, which results in a chronic inflammation in or around the joint. Baking and hot compresses may relieve pain and should hasten repair in the bone or soft tissues. Great care should be taken in restoring the patient to normal activity, and this can best be accomplished by graduated exercises and active and passive stretching.

Where there has been an error in diagnosis, and therefore unintelligent treatment, the cases become chronic and suffering is intense. The following cases were selected because a thorough roentgenological study immediately following the injury would have been the only means of arriving at a correct diagnosis:

#### CASE REPORTS

**Case 1**—L. A., male, age 56. While lifting heavy sacks of sugar caused an acute right sacro-iliac strain. His symptoms improved only slightly under treatment. No X-rays were taken until four weeks after the accident. They showed the fifth lumbar vertebra to be situated unusually low between the crests of the iliac bones, with a possibility that the transverse process of that vertebra may impinge on either ilium and strain the sacro-iliac ligaments. This condition of the lumbo-sacral spine makes that region much more susceptible to injury. There was also evidence of an hypertrophic arthritis of the lumbar spine. The accident was not the real cause of the discomfort of which he complained four weeks later.

**Case 2**—J. H., male, age 35. An acute strain of the lower lumbar spine when swinging a sledge hammer, while bending forward with rotation. He was unable to do heavy work three months later, when the first X-rays of the injured region were taken. They revealed a malformation of the fifth lumbar vertebra, but no forward or downward displacement of it. An extra sacral vertebra was also revealed, which with the malformation of the fifth lumbar is a weak place during heavy lifting, and added greatly in producing the strain which will be slow to repair.

**Case 3**—G. T., female, age 32. Has had repeated attacks of sharp pain, coming on gradually, starting in the right sacro-iliac region, and being slowly transmitted to the right hip and down the right lower extremity. After rest in bed for a few days these attacks entirely subsided. There was never anything unusual that seemed to produce an attack. The first X-rays were taken March 30, 1922, and showed a congenital anomaly in the lumbo-sacral region, that is, a sacralized last vertebra. The transverse process on the right side has all the roentgenological ear-marks of being a lumbar vertebra, while on the left it has the characteristics of a sacral vertebra, and this transverse process also articulates with the top of the sacrum. This condition is a constant strain to the right sacro-iliac joint, and easily produced the symptoms of which she complains.

**Case 4**—H. F., male, age 44. Had always lived a sedentary life until two months before his alleged injury, during which time he was doing heavy labor. One day following extra heavy lifting his lower back was stiff and quite painful, so that he was unable to continue work. These symptoms have cleared up, but he now complains of pain in the right sacro-iliac region, which is transmitted down the right lower extremity. The first X-ray was taken five months after the injury. This showed a congenital malformation of the last lumbar vertebra, and one which is more prone to strain than is the normal back.

**Case 5**—M. P., male, age 37. Complains of pain

and weakness of the lower back during the past few years, and at times quite severe and with no history of injury to the spine. Recently he has taken long automobile rides, some of them over rough roads. The first X-rays of his spine were taken August 1, 1921, and showed only four lumbar vertebrae, the fifth being sacralized and having all the X-ray appearances of a sacral vertebra. Its position is practically that of the first sacral, producing a congenital anomaly of the sacro-iliac region. This type of spine is mechanically incorrect and therefore much more prone to injury than is the normal back.

**Case 6**—J. McK., male, age 46. Suffered an injury to the lower back and right sacro-iliac regions when a heavy timber which he was holding suddenly slipped. X-rays which were taken soon after the injury showed an overgrowth of bone connecting the bodies of the fourth and fifth lumbar vertebrae and a congenital anomaly in the lumbo-sacral junction, there being a sixth lumbar vertebra which is situated unusually low between the crests of the iliac bones. The symptoms of acute strain were treated, and his condition grew gradually worse. X-rays taken fourteen months later gave the same findings as above, but, if it had not been for those taken immediately after the injury, it would have been impossible to have properly rated the patient.

**Case 7**—W. L., male, age 32. While lifting bundles of lumber over his head and tossing them into a truck he felt a sharp pain in the left upper lumbar region, and was unable to continue work. For nearly two and a half years his condition grew worse under various kinds of treatment. One and one-half years after the injury the first X-ray was taken and showed no lesion, but, as it was not clear, another one was immediately taken, which showed a fracture of the left transverse process of the first lumbar vertebra, with separation of the fragments. This was removed, adhesions along the entire spine were actively freed, and two months later he returned to full time work.

**Case 8**—J. G., male, age 19. Was tossed in a blanket at school and fell several feet, striking on his neck. It has been three years since the accident, and certain twisting movements still cause severe pain which lasts several days. No X-ray was taken until recently, which revealed a slight narrowing of the body of the sixth cervical vertebra, probably caused at the time of his accident. It is a very common site for fractures of the body of the cervical vertebrae; but this could only be definitely proven by comparing with plates made immediately after his injury. After freeing adhesions a full and painless range of motion was restored.

**Case 9**—B. S., male, age 36. Was struck on the forehead while looking up, and his head was violently thrown back. Since the accident, several months ago, he has been treated actively with no support for the head, his condition gradually growing worse. The first X-ray was then taken and showed that a spicule of bone had been pulled from the lower part of the body of the fifth cervical vertebra—a fracture-sprain. I am presenting the anteroposterior view to prove how easily the lesion could have been missed without a clear lateral view which is so often omitted.

**Case 10**—M. B., male, age 49. Tripped over a bale of hay and fell about twelve feet, the bale of hay landing on his back. This was followed shortly by total motor and sensory paralysis of the lower extremities, which cleared up during the next few weeks. Now there is pain, stiffness, and marked weakness of the lumbo-sacral region, and inability to move the lower spine. X-rays of the lower spine were taken soon after the accident and were reported negative to fracture and dislocation, but gave evidence of hypertrophic spondylitis. X-rays taken nine months later showed an

increase in the density of the left lumbo-sacral articular facets, due to new bone formation. This overgrowth of bone may be the result of a fracture at the time of the accident and the direct cause of his present discomfort. That is a common site of fracture and one which is frequently overlooked.

**Case 11**—C. C., male, age 40. Fell from a roof, landing on the top of his head. There was severe pain in the mid-dorsal region, and in the front of the chest. No X-rays were taken, and he was treated for simple back strain, but without improvement. The first X-rays were taken eight months later, and showed a compression fracture of the body of the eleventh dorsal vertebra. A complete study of his spine also showed congenital anomalies, such as a sacralized last lumbar vertebra, the transverse processes having all the characteristics of a sacral vertebra, and a slight sacral spina bifida.

**Case 12**—J. B., male, age 50. Was struck violently on the top of the head by a piece of rapidly moving casing. He had a sharp pain at about the level of the eleventh and twelfth ribs whenever he moved. No X-rays were taken. He returned to work in two weeks, but gradually grew worse and had to stop. The first X-rays were taken six months later, and showed a comminuted fracture of the body of the eleventh dorsal vertebra, which is wedge-shaped, with a fracture line through the anterior part of the body. An anteroposterior view alone would have failed to reveal the extent of the lesion.

**Case 13**—J. K., female, age 35. Ten years ago fell forty feet, landing on her feet, and then immediately and forcibly taking a sitting position. There was intense pain in the back, the sensation of formication of both legs and the lower part of the body, and complete flaccid paralysis of the left foot. No X-rays of her spine were taken until recently, which showed an old fracture of the first lumbar vertebra, with some new bone and ankylosis of the spines and laminae of the first and second lumbar vertebrae. Her paralysis is probably due to cord injury of the fourth and fifth lumbar segments, which lie about opposite the first lumbar vertebra.

**Case 14**—G. S., male, age 51. While sitting on a camp stool lacing his shoe, which was on the running board of his machine, fell suddenly to the ground because the stool collapsed. Pain, spasm and limited motion in the lower back grew gradually worse under treatment for back strain. Two months after the accident an X-ray was taken, and reported negative to any injury of the spine. Eight months later there was not only no improvement, but there were beginning motor and sensory disturbances of the right lower extremity. An X-ray at that time revealed a compression fracture of the body of the fifth lumbar vertebra.

**Case 15**—S. K., male, age 25. A steeple-jack. Fell fifty feet from a flag pole, landing upright on both feet. An anteroposterior but no lateral X-ray of the spine was taken a few days after the accident and there was no treatment for the spine. On the other hand he was allowed to sit up and twist his body in any direction. Two months later both anteroposterior and lateral views were taken, and showed a crushing of the body and pedicles of the third lumbar vertebra, with displacement forward and a large wedge-shaped piece displaced anteriorly. The body of the fifth lumbar was also crushed, but there was no displacement. Although there were no cord symptoms, he was given rigid treatment for the spine and a most excellent result was obtained.

A careful and complete diagnosis of the above lesions will often make intelligent treatment possible, and will prevent much unnecessary disability and suffering.

## THE OUTLOOK IN NEURO-PSYCHIATRY \*

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It seems fitting for me to address you in this retreat of nature, far away from our practical activities of the consultation-room, hospital and laboratory, not on a technical subject of neuro-psychiatry, but on the expectancy of progress and future knowledge in this, our special field. Each one of us, in the light of new individual experience and accurate observation, is contributing more or less toward this progress and knowledge. Scientific medical advance is not made, however, by leaps and bounds, but by the time-consuming and painstaking recording and interpretation of facts and by their practical application to the problems at hand. Even the trained medical man because of such conservative and sound methods, may not be conscious of, or at least may for the time forget, the steady advance of recent years, so I trust it may not be amiss, before indulging in prophecy, to give a brief retrospect of the neuro-psychiatric progress in the last two decades.

This period has witnessed a considerable addition to our clinical knowledge by technical tests, and by defining disease syndromes, confirmed by histo-pathologic investigations. Noteworthy is the better understanding of motor disorders; the valuable addition of the pathologic pyramidal tract reflexes; the separation from the spastic pyramidal tract disorders of the plastic rigidities, dystonias and involuntary and associated movements of the corpus striatum group, which has developed particularly from the studies of lenticular degenerations, paralysis agitans, and epidemic encephalitis; and the separation of cerebellar ataxia from the peripheral ataxias by the definition and study of muscle asynergias.

Brain localization, especially as regards the localization of speech, has undergone a very healthful revision by more exact anatomical studies. The discovery of the remarkable autonomy of the divided spinal cord in man has thrown great light on the physiology of the cord and especially on its reflex action and tonus mechanism. The sympathetic nervous system has been the subject of much physiological and clinical investigation, and the close relationship between this part of the nervous system and certain of the glands of internal secretion has been definitely established.

Lumbar puncture and cerebrospinal analysis have become routine diagnostic procedures, without which a neurological diagnosis is at times impossible. Studies of the cerebrospinal fluid circulation have explained the mechanism of hydrocephalus, and suggested a means of its correction. The replacement of the cerebrospinal fluid by air has permitted the exact picturing of the subarachnoid space by pneumograms, thus outlining the ventricular and cisterna cavities. By this method encroachment on these spaces as by tumors may be demonstrated, also the existence of a circula-

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